OPERATING INSTRUCTIONS

VOLT-AMP TESTER

MODEL E-1402

ALLEN

Allen Electric and Equipment Company

Kalamazoo, Michigan • Walkerville, Ontario

IMPORTANT NOTICE

You have received the latest series of the Model E-1402 Volt-Amp Tester.

This series has some new features which allow extended usage of the unit and allow the operator to cover electrical systems which are new on the market now and others that are in the planning stage.

The Operating Instructions cover all the lead connections and in general cover the operation of the unit, HOWEVER, the following should be applied as additions and explanation of this series. CAREFULLY READ AND APPLY to the Operation of the unit.

A. The Meter scale has been changed from a 1, 10 and 20 volt scale to a 2, 20 and 40 volt scale. When reference is made to the 1, 10 and 20 volt scale in the instructions, convert to the 2, 20 or 40 volt scale. Thus when reference is made to the 1 volt scale, use the 2 volt scale. When reference is made to the 10 volt scale use the 20 volt scale. The 40 volt scale is to be used when checking or testing 24 volt systems. The 40 volt circuit operates when the TEST SELECTOR SWITCH is in the EXTERNAL POSITION, and the VOLTAGE SELECTOR SWITCH is in the 40 volt position.

B. EXTERNAL TEST: With TEST SELECTOR in EXTERNAL position an external shunt must be used to obtain a current reading.

If it is desired to make the instrument more sensative to low current an external shunt and lead may be obtained from the factory to convert the ammeter to full range of 8 amperes, (part number 70006). A shunt and lead is also available to provide a scale range of 0 to 160 amperes,(part number 70007).

C. CHECKING DOUBLE CONTACT REGULATORS:

1. The vehicle battery should be fully charged.

2. CAUTION DO NOT GROUND the generator or regulator "FIELD" terminal when checking Double Contact Regulators.

3. Remove wire attached to regulator OR generator field terminal and connect Allen Model E-328 Field Rheostat (or equivalent in generator/regulator field circuit so as to be able to control and/or cycle generator.)

4. Connect E-1402 Volt Amp Tester as shown in Figure 7 of the E-1402 Operating Instructions.

5. Start engine and operate at RPM as given in manufacturers specifications relating to specific regulator being checked.

6. With E-328 Field Rheostat turned to minimum resistance position, operate engine so as to obtain regulator operation as specified by the manufacturer

Continue to operate long enough to stabalize regulator temperature. Regulator cover must be in place.

NOTE: (SET OF CONTACTS, as indicated here can mean upper or lower "SET OF CONTACTS" or upper or lower "STAGE" contacts depending upon brand of regulator.)

7. Cycle generator by turning E-328 Field Rheostat to "open" position then slowly decrease (turn out) resistance. Regulator should be operating on "set of contacts" as specified by manufacturer.

8. Increase resistance of E-328 Field Rheostat slowly until the regulator operates on specified "set of contacts" according to manufacturers specifications. Note carefully that there will be a difference between the voltage readings obtained when the regulator is operating on one or the other set of contacts. Adjust if needed according to the manufacturers specifications. Usually a difference of between 1/10 and 6/10 volts will be observed. The manufacturers specifications, as applys to the specific regulator being checked, MUST BE followed.

9. Refer to Manufacturers Service Manual when rebuilding or making adjustments to regulator.

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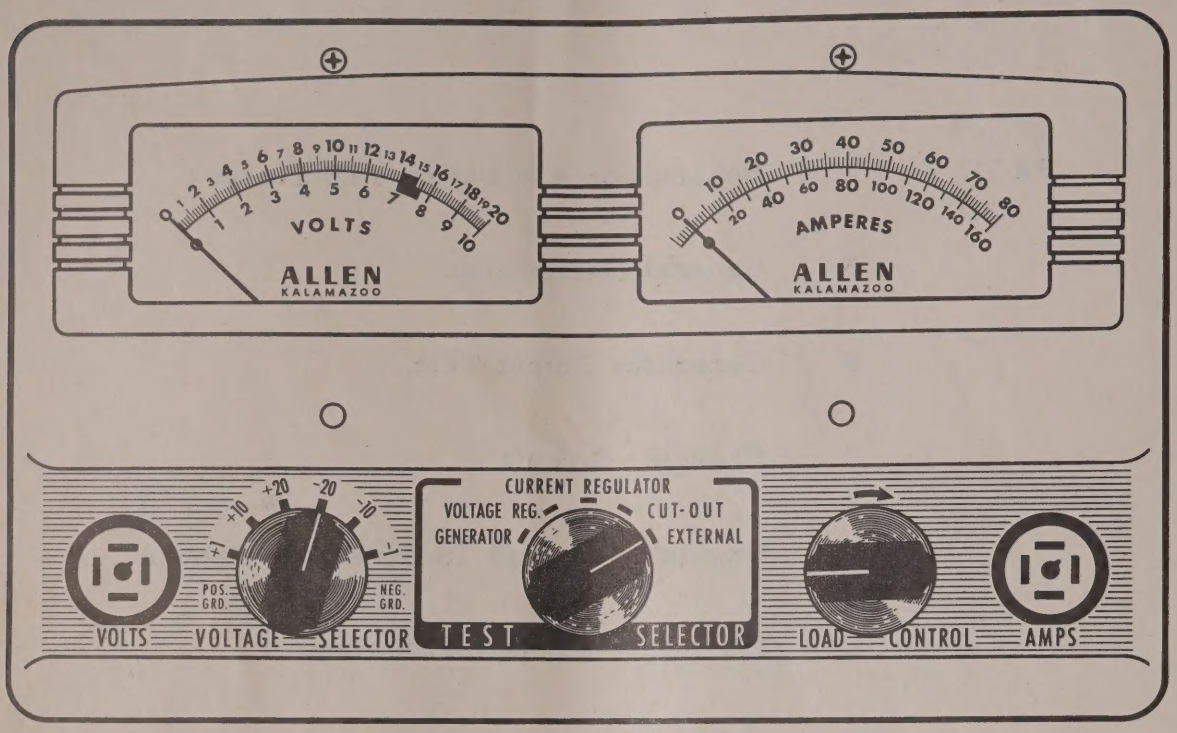


FIG. 1

DESCRIPTION AND PURPOSE

The Allen Model E-1402 Volt-Amp Tester is a precision instrument, providing the means for testing automotive electric circuits, and makes possible corrective adjustments of circuit parts for proper operation.

Simplicity of operation is accomplished through use of panel controls, making possible all major tests, such as, GENERATOR OUTPUT, and REGULATOR tests without it being necessary to change the test lead connections. VOLTAGE DROP in GENERATOR-BATTERY, and STARTER-BATTERY CABLES can be checked by changing but one test lead clip connection.

The unit contains a voltmeter, and ammeter for voltage and current measurements, with fixed and adjustable resistance units, and selector switches, enabling the operator to apply proper series resistance, and, or, circuit load at will.

Fixed resistors in series with the battery for testing either 6 or 12 volt regulators are available simply by turning the Test Selector to test desired. An adjustable load is also provided, that returns to open circuit as soon as released.

Voltage readings of 0-1, 0-10, and 0-20 with either test lead clip positive, or negative polarity can be obtained by selector switch control. Current readings of 0-80 amperes are obtainable with an internal shunt. Current readings of 0-8, and 0-160 amperes may be made by using external shunts available as accessories.

GENERAL INSTRUCTIONS

BATTERY AND WIRING

Before any tests or adjustments of the Voltage Regulator are attempted, the battery and charging circuit wiring should be inspected and tested according to the procedures outlined in this manual.

CORRECT REGULATOR

Refer to car manufacturer's specifications for correct regulator for application.

ADJUSTMENTS

Mechanical checks and adjustments must be made with the battery disconnected and the voltage regulator off the vehicle. Electrical checks and adjustments may be made with the regulator either on or off the vehicle.

TEMPERATURE

It is important to have the regulator at operating temperature and the cover and gasket in place when making voltage or current measurements. When making electrical tests or adjustments with the regulator off the vehicle, the regulator should be mounted in the operating position on the test fixture.

CUTOUT RELAY POINTS

Caution: The cutout relay contact points must never be closed by hand with the battery connected to the voltage regulator. This will cause damage to the relay contact points and may cause damage to other equipment.

CURRENT REGULATOR

The current regulator provides protection to the generator, preventing it from exceeding its maximum rated output. Never set the current regulator above the maximum specified output of the generator.

VOLTAGE REGULATOR

The voltage regulator unit limits the voltage of the circuit, thus protecting the battery, distributor points, lights, and other accessories against high voltage. At the same time, the voltage regulator permits a sufficiently high voltage to keep the battery charged.

VOLTAGE SETTING

The voltage regulator unit should not be set outside specified limits except in special cases where continuous battery overcharge is experienced due to high battery temperatures.

HIGH TEMPERATURE VOLTAGE SETTING

Under conditions where high battery temperatures are obtained, battery overcharge may be experienced and will be indicated by excessive use of water. It should not be necessary to add water to the average truck or passenger car battery more frequently than about once every thousand miles. When the voltage regulator setting is within specified limits and the battery still requires water more often than this, it is an indication of overcharge and may be relieved by reducing the voltage setting slightly. Do not reduce voltage setting unless it is actually necessary and then be sure to readjust the closing voltage of the cutout relay so that it is approximately .5 volt below the voltage regulator setting.

At the onset of cold weather, the settings of the voltage regulator and cutout relay should be increased to within specified limits to avoid undercharged battery conditions.

DIRTY CONTACT POINTS

Most regulator complaints arise from dirty and oxidized contact points. Clean the contact points with a regulator file, never use emery cloth or sandpaper to clean contact points.

REGULATOR POLARITY

Many voltage regulators are designed to be used with a positive grounded battery only, while others are designed to be used with a negative grounded battery only. Never attempt to use the wrong polarity regulator on an application.

POLARIZING GENERATOR

The generator should always be repolarized after reconnecting all leads and before starting the engine. Generators having externally grounded fields can be polarized by momentarily connecting a jumper lead between the "Gen" and "Bat" terminals of the regulator. Generators having internally grounded fields can be repolarized by disconnecting the lead from the field terminal of the regulator and momentarily touching this lead to the regulator battery terminal.

CYCLING THE REGULATOR

It is always necessary to cycle the regulator before taking any readings when making an electrical test of this unit. Regulators can be cycled either by retarding engine speed to a point sufficient to permit the cutout relay points to open, or by operating the engine at a medium speed and reducing generator output by means of field rheostat.

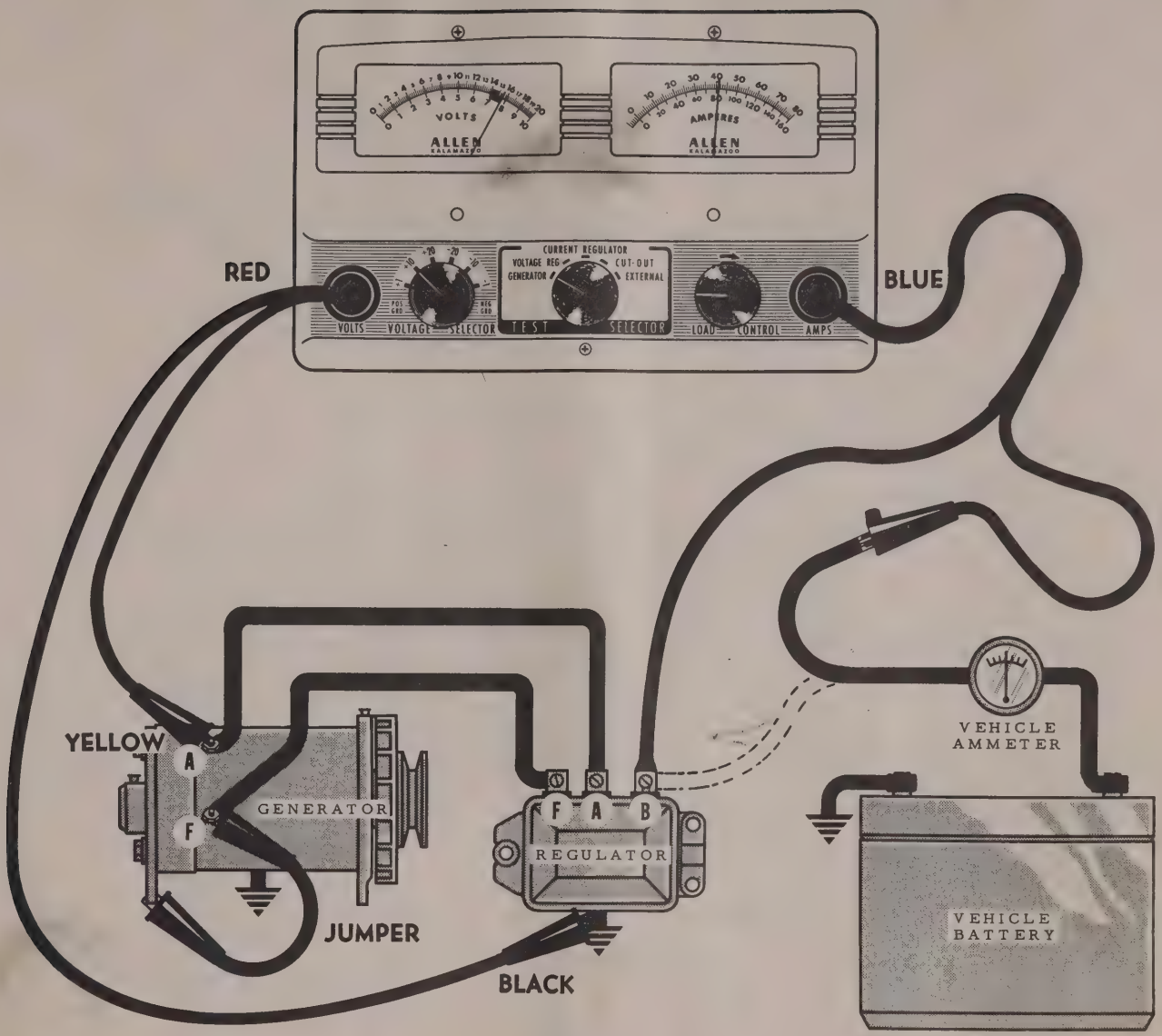


FIG. 2

A- GENERATOR OUTPUT TEST

1. Turn Test Selector to GENERATOR position, Figure 2.

2. Turn Voltage Selector to 10 for 6 volt systems, or 20 for 12 volt systems. Set to POLARITY corresponding to vehicle battery ground.

3. Make connections as shown, Figure 2. Prevent regulator from operating, by connecting JUMPER lead from generator "F" (field) terminal to generator frame on generators with EXTERNALLY grounded fields.
   For INTERNALLY grounded field generators, such as, FORD PRODUCTS, connect the JUMPER between the generator "F"(field) terminal and "A" armature terminal.

4. Turn on vehicle lights (to guard against generation of excessively high voltage), and operate engine at sufficient speed to produce rated generator output. The maximum output of generators using current regulators is determined by the current setting of the current regulator.

   Third brush generators must be tested with fully charged battery in the circuit, never adjust third brush generators above rated output.

GENERATOR OUTPUT TEST - DIAGNOSIS

NO OUTPUT - May be due to following:

GENERATOR	
Armature	Open or grounded
Brushes	Not seating on commutator
Brushes	Broken "pigtail" or poor connection
Commutator	Burned or dirty
Field	Open or shorted
REGULATOR	
Points (cutout)	Open, burned, or dirty

UNSTEADY OR LOW OUTPUT

DRIVE BELT	Loose and slipping
GENERATOR	
Armature	Shorted
Brushes	Spring tension weak
Brushes	Not seating on commutator, sticking
Commutator	Burned, or dirty
Commutator	Mica high, needs undercutting
Commutator	Worn out of round, needs turning and undercutting
Field	High resistance circuit connections
Field	Shorted windings
Frame	Loose mounting, poor ground to engine
WIRING, CABLES	Corroded connections, poor bonding etc.

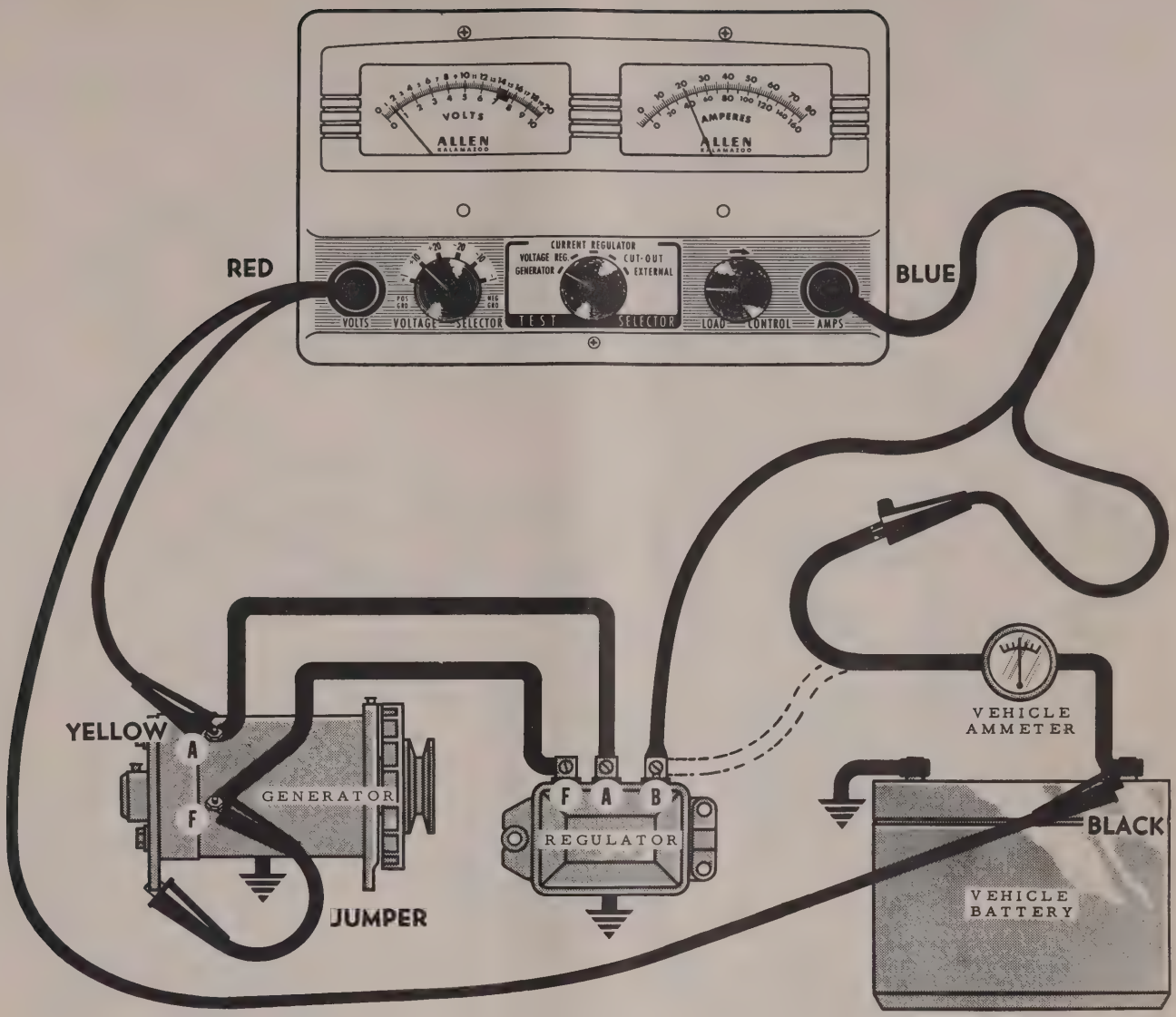


FIG. 3

B - VOLTAGE DROP IN CHARGING CIRCUIT TEST

PURPOSE OF TEST - To determine if loose or corroded connections, or faulty cutout points are causing an "undercharge" battery condition.

1. Turn Test Selector to GENERATOR position, and Voltage Selector to 10 volt position. Set to POLARITY corresponding to battery ground.

2. Make connections as shown, Figure 3. Connections are the same as for generator output test, except the BLACK voltmeter clip is attached to the "HOT" battery post.

3. Operate the engine to give 20 ampere charging rate.

4. If voltmeter reads less than 1 volt, turn Selector Switch to 1. volt position. There is excessive voltage drop if reading is over .75 volt.

   RETURN SELECTOR TO 10 or 20 VOLT POSITION, to guard against overloading the meter on the low range, and REMOVE JUMPER.

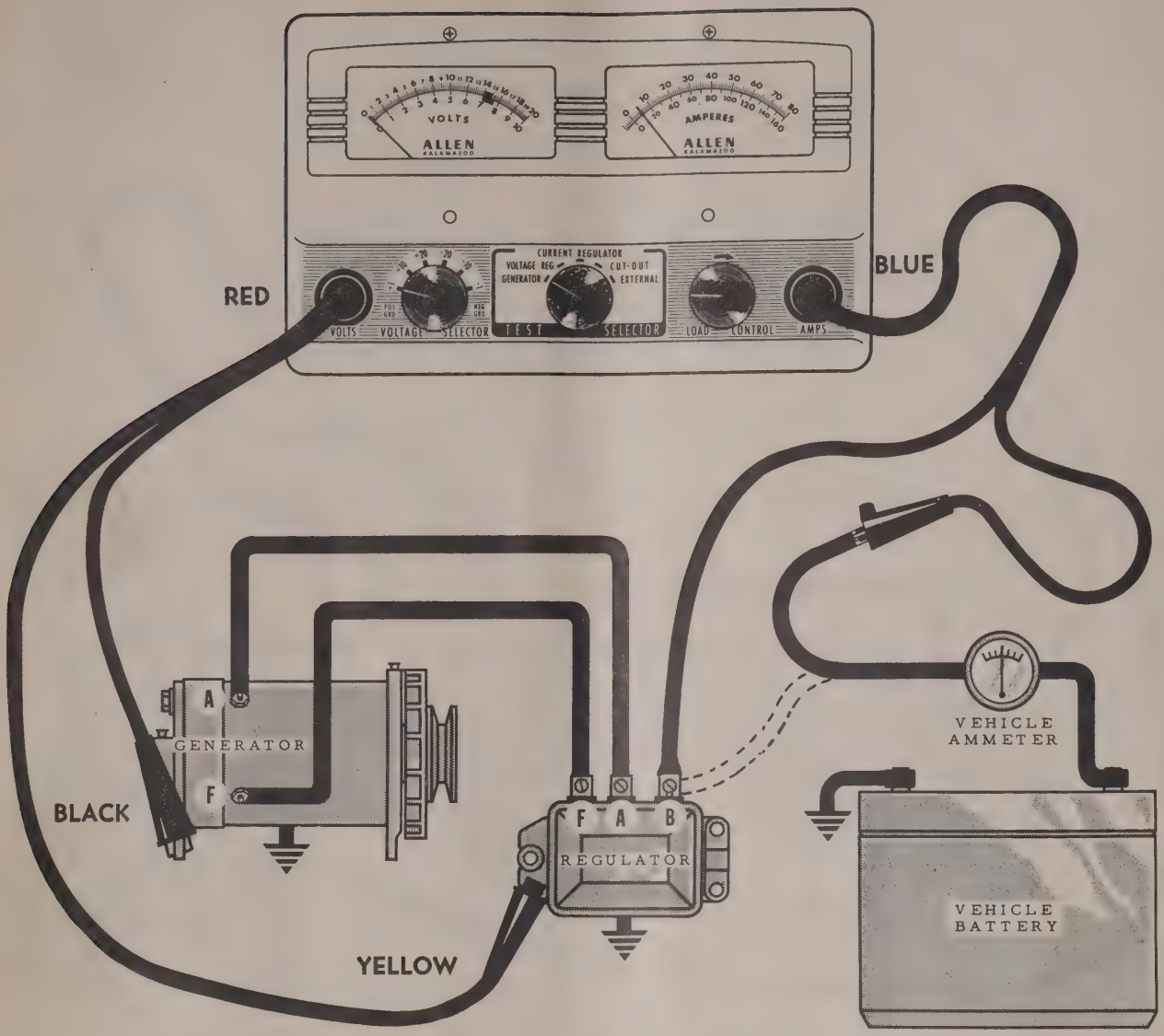


FIG. 4

REGULATOR GROUND TO GENERATOR GROUND DROP TEST

1. Turn Test Selector to GENERATOR position, and VOLTAGE Selector to 1. volt position, and POLARITY corresponding to battery ground.

2. Make connections as shown, Figure 4.

3. Operate engine to give 5 ampere charging rate. DO NOT have lights, radio, heater, or other electrical accessories turned on.

4. There is excessive voltage drop if reading is more than .05 volt. Such readings indicate a faulty ground at the regulator, generator, or in some cases between the vehicle body and engine ground.

   Clean and tighten generator and regulator mountings to provide good electrical bonding.

5. RETURN SELECTOR TO 10 or 20 volt position, to guard against overloading the meter on the low range.

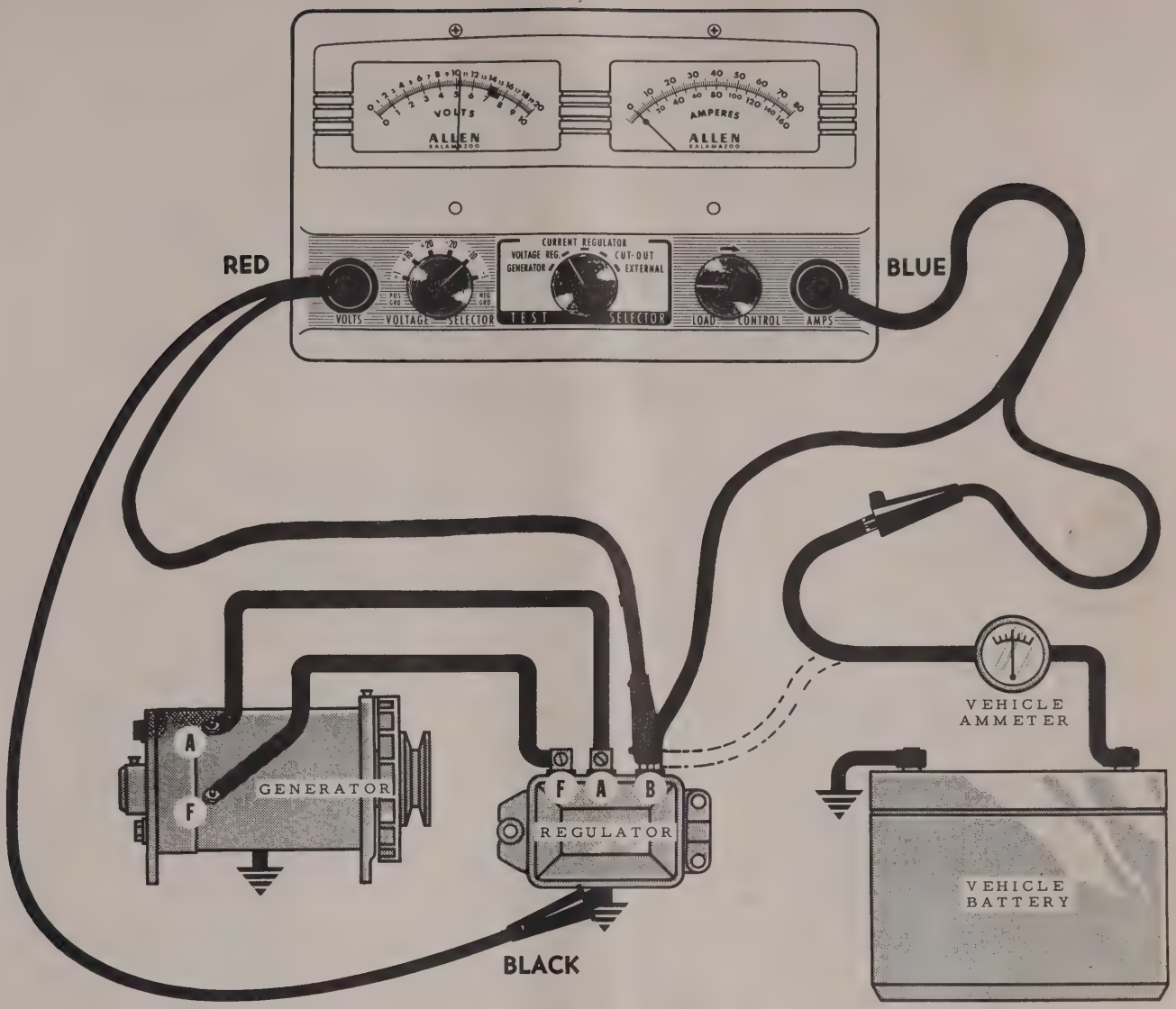


FIG. 5

C - STARTER - CABLES - BATTERY TEST

1. Turn TEST Selector to VOLTAGE REGULATOR position, and VOLTAGE Selector to 10 for 6 volt systems, or 20 for 12 volt systems. Set to POLARITY corresponding to vehicle battery ground.

2. Make connections as shown, Figure 5.

3. Read voltage while starter cranks engine with ignition switch "OFF" (to prevent starting). If the ignition switch must be turned on to operate the starter, pull out the high tension lead from center of distributor cap, and ground to the motor block.

   Voltage readings should be at least 4.5 for 6 volt systems, and 9. for 12 volt systems. If reading is less, it indicates excessive voltage drop in starter cable, battery cable, connections, or discharged or defective battery and separate tests should be given each.

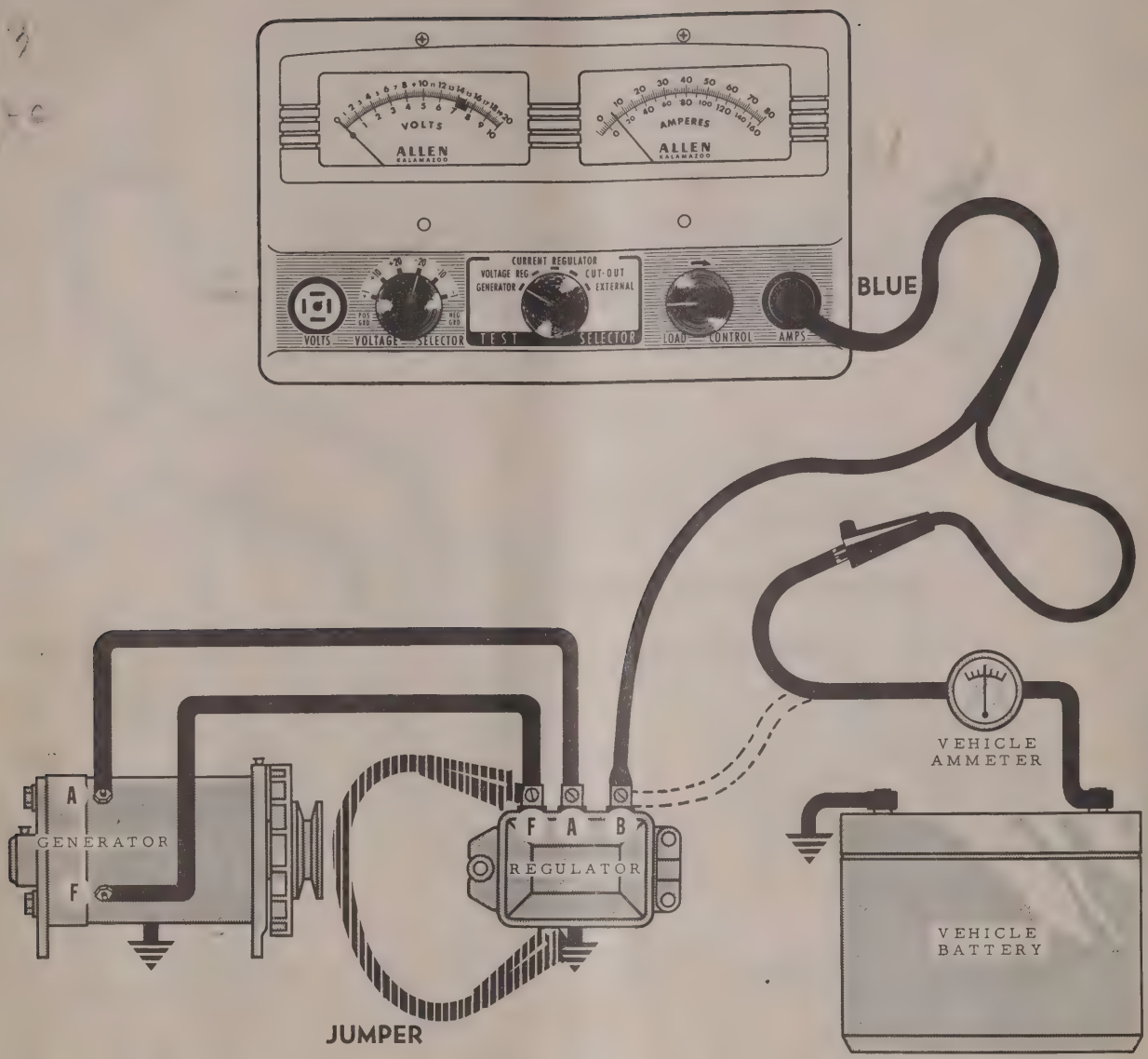


FIG. 6

OXIDIZED REGULATOR CONTACT POINT TEST - (Delco Remy Regulators)

1. Turn TEST Selector to GENERATOR position, and set VOLTAGE Selector to POLARITY corresponding to battery ground.

2. Make connections as shown, Figure 6, do not connect JUMPER until later.

3. Turn on headlights and operate engine to give 5 ampere charging rate.

4. Connect JUMPER between regulator "F" (field) terminal and regulator ground. If charging rate increases more than 2 amperes, oxidized contact points are indicated, and the regulator should be removed and contacts cleaned.

   IMPORTANT - Always clean the flat (largest) contact points with a "regulator" file. Emery cloth or sandpaper should never be used, since particles of emery or sand may embed in the contacts and prevent normal operation.

   After cleaning the contacts, readjust to manufacturer's specifications.

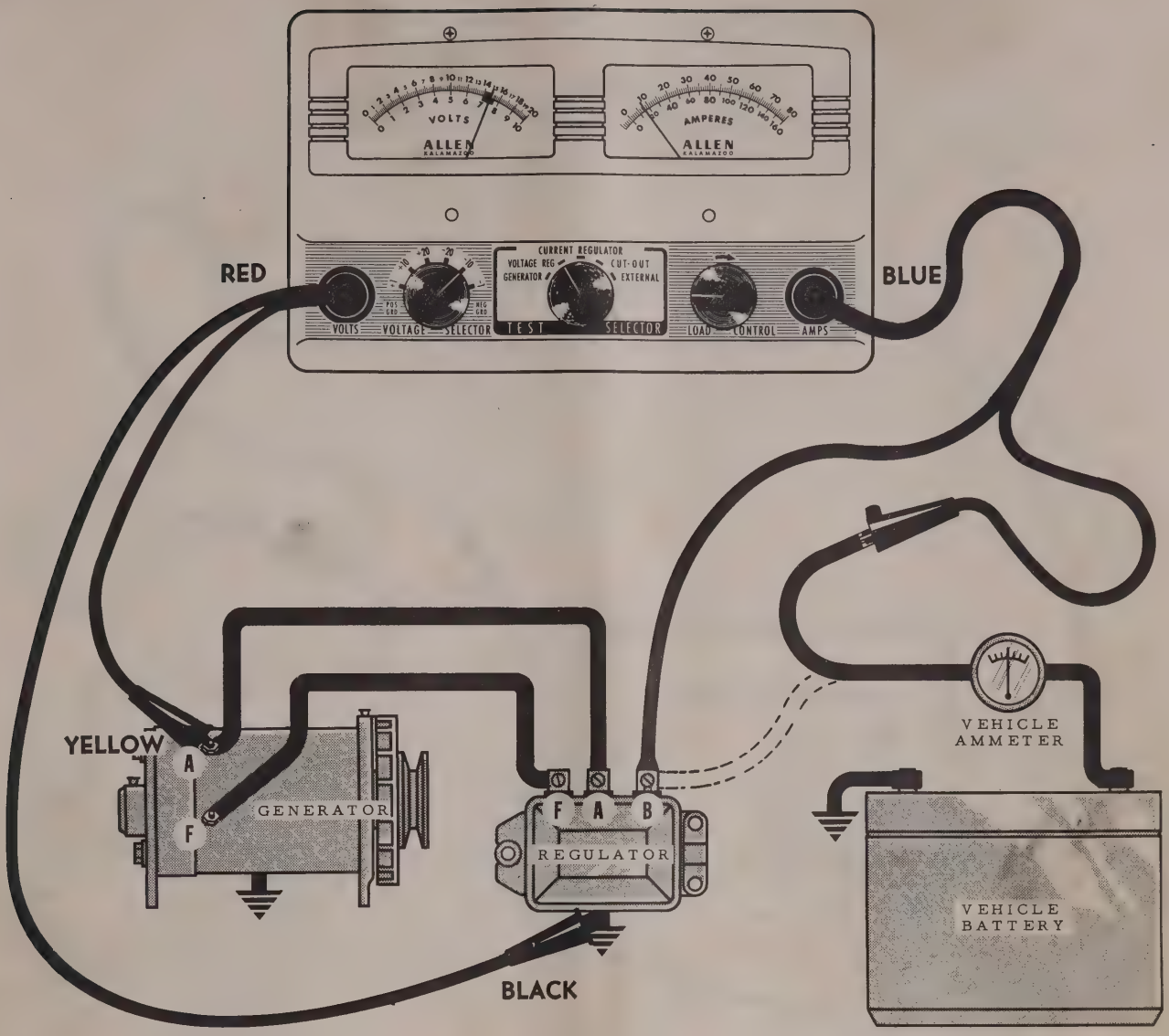


FIG. 7

D - VOLTAGE REGULATOR TEST

1. Turn TEST Selector to VOLTAGE REGULATOR position, and VOLTAGE Selector to 10 for 6 volt systems, or 20 for 12 volt systems. Set to POLARITY corresponding to vehicle battery ground.

2. Make connections as shown, Figure 7, and have lights and accessories "OFF".

3. Operate engine at 1600 R.P.M. for at least 15 minutes to bring the regulator to operating temperature. The cover should be on regulator for all tests.

4. Cycle the generator by reducing engine speed to idle to allow the cutout points to open; then gradually increase speed until maximum reading is obtained on voltmeter. Reading will be the voltage for which the voltage REGULATOR is adjusted. Compare with manufacturer's specifications on voltage settings. Current readings between 1 and 10 amperes are satisfactory for this test.

   For FORD and AUTO-LITE, operate engine at 2000 R.P.M. and turn LOAD Control to obtain 12 ampere rate, then read voltage.

CAUTION - DO NOT HOLD LOAD CONTROL ON LONGER THAN NECESSARY TO READ METER.

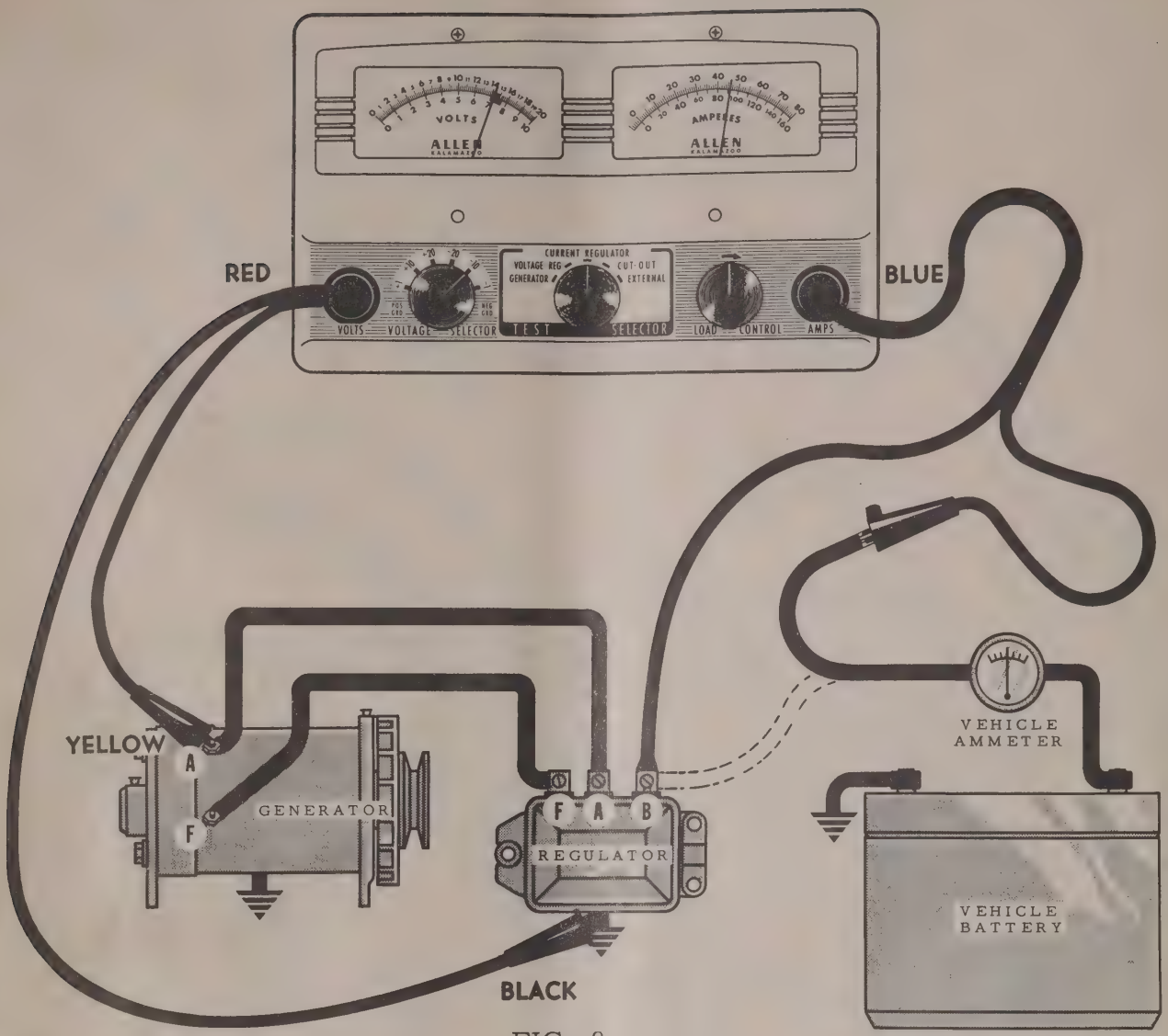


FIG. 8

E - CURRENT REGULATOR TEST

1. Turn TEST Selector to CURRENT REGULATOR position, and VOLTAGE selector to 10 for 6 volt systems, or 20 for 12 volt systems. Set to POLARITY corresponding to vehicle battery ground.

2. Make connections as shown, Figure 8.

3. Operate engine with all lights and accessories turned on, for at least 15 minutes to bring regulator to operating temperature. The cover should be on the regulator for all tests.

4. Cycle the generator by reducing engine speed to idle to allow the cutout points to open;then increase speed to 2000 R.P.M.

5. Turn LOAD CONTROL to highest ammeter reading;this is current for which current regulator is adjusted. Compare with manufacturer's specifications.

CAUTION - DO NOT HOLD CONTROL ON LONGER THAN NECESSARY TO READ METER.

F - CUTOUT TEST

1. Turn TEST SELECTOR to CUTOUT position, and VOLTAGE SELECTOR to 10 for 6 volt systems, or 20 for 12 volt systems. Set to POLARITY corresponding to vehicle battery ground.

2. Make connections as shown, Figure 8.

3. Operate engine at approximately 1000 R.P.M.

4. Turn LOAD CONTROL CLOCKWISE, and note reverse reading on ammeter when cutout relay points open (highest reverse reading on ammeter). Compare with reverse current specifications if furnished by manufacturer.

5. Release LOAD CONTROL SLOWLY, and read points closing voltage. This is indicated by abrupt rise in voltmeter reading. Compare with manufacturer's specifications.

EXTERNAL TEST

With TEST SELECTOR in EXTERNAL position it is possible to adapt the tester ammeter to other scale ranges than the 80 amperes provided by the internal shunt.

If desired to make the instrument more sensitive to low current, an external shunt and lead (W-94) may be obtained from the factory to convert the ammeter to full scale range of 8 amperes. A shunt and lead (W-95) is also available to provide a scale range of 0 to 160 amperes.

WRITING THE FACTORY

Should it be necessary to communicate with the factory, relative to your tester, ALWAYS furnish its NAME, MODEL, and COMPLETE SERIAL PLATE DATA, so that prompt and efficient attention can be rendered.

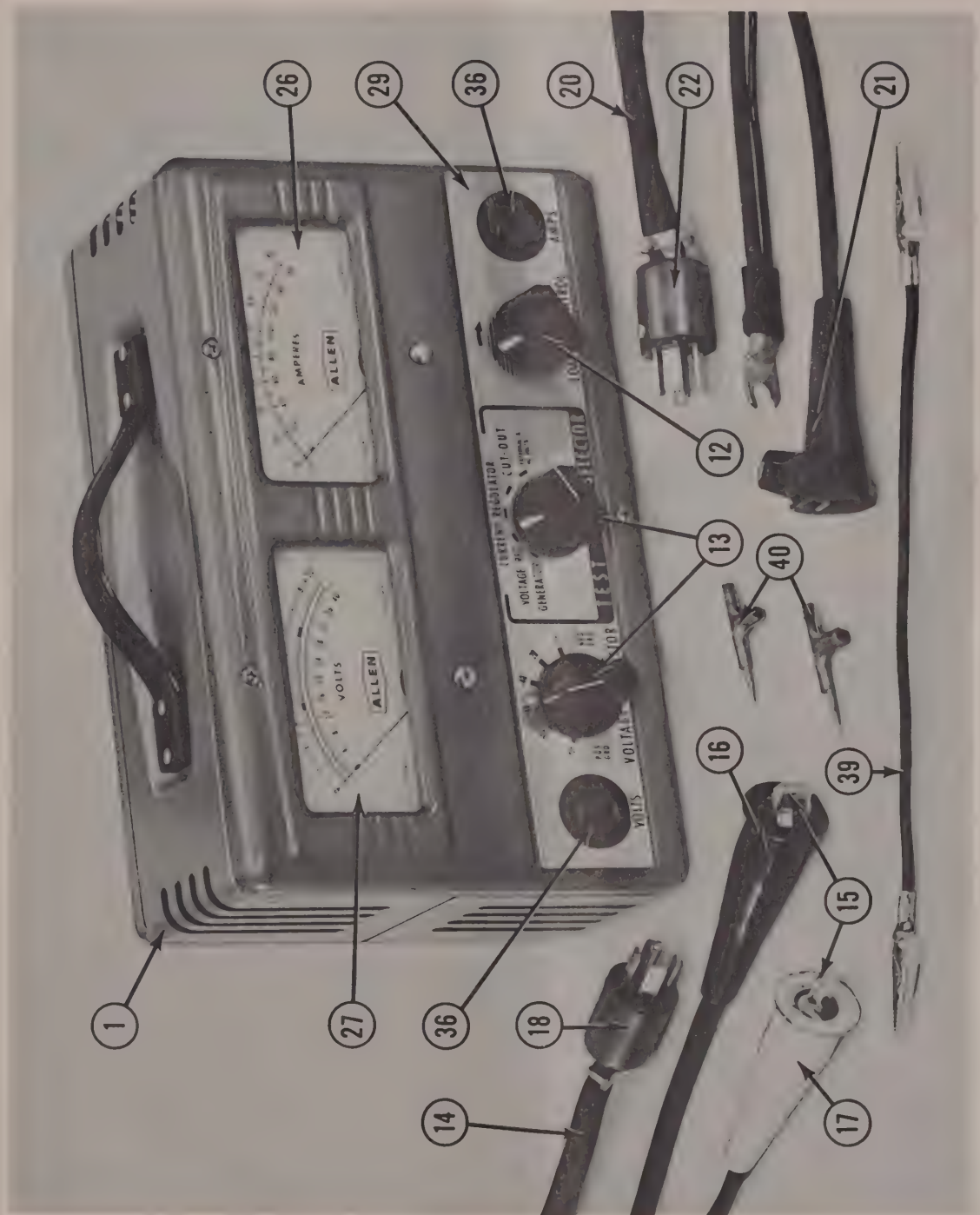
ALLEN ELECTRIC AND EQUIPMENT CO.
KALAMAZOO, MICHIGAN, U.S.A.

ALLEN ELECTRIC AND EQUIPMENT CO.

PARTS LOCATION PHOTOGRAPH

SERIES E

VOLT-AMP TESTER
E-1402

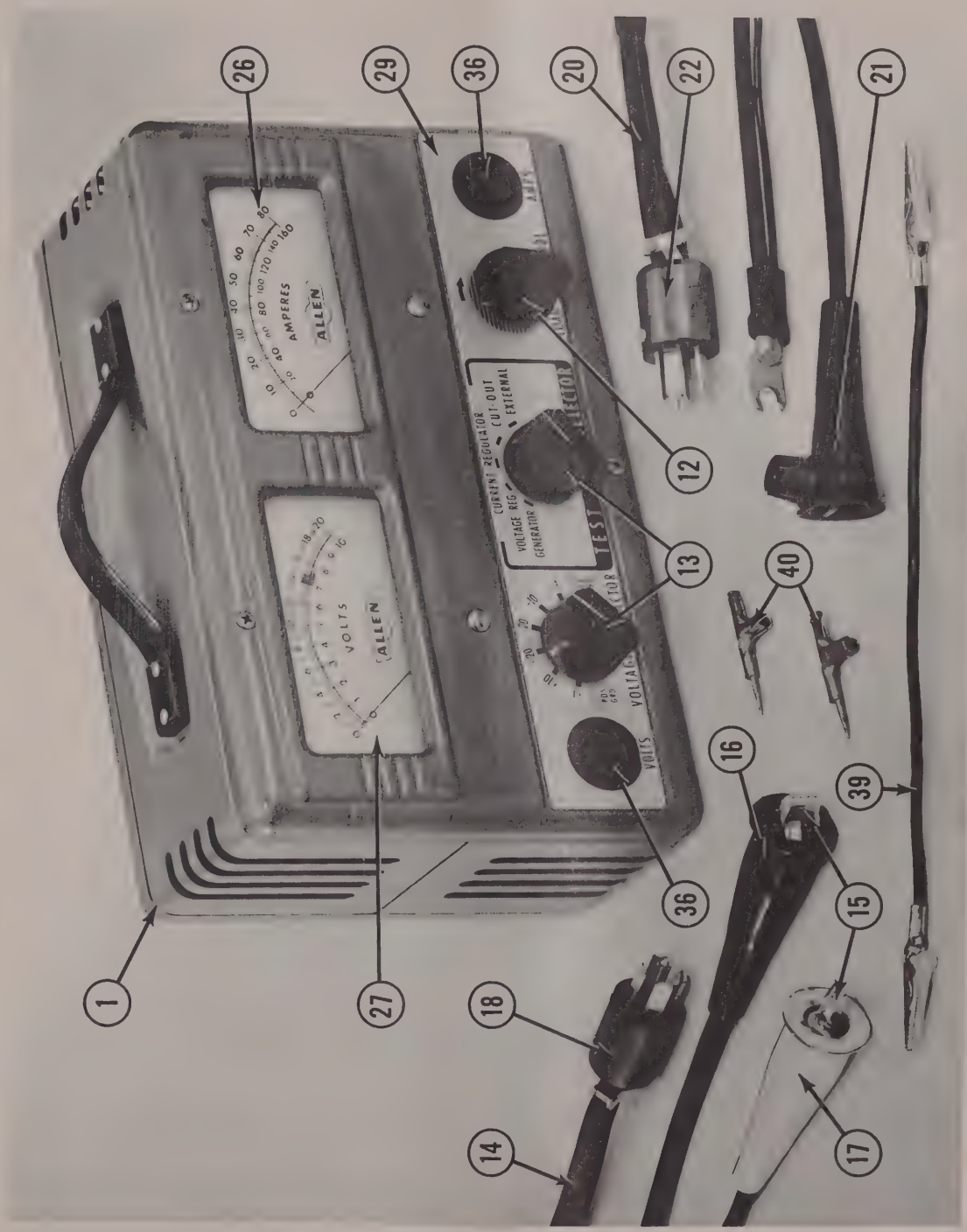


ALLEN ELECTRIC AND EQUIPMENT CO.

PARTS LOCATION PHOTOGRAPH

SERIES F

VOLT-AMP TESTER
E-1402

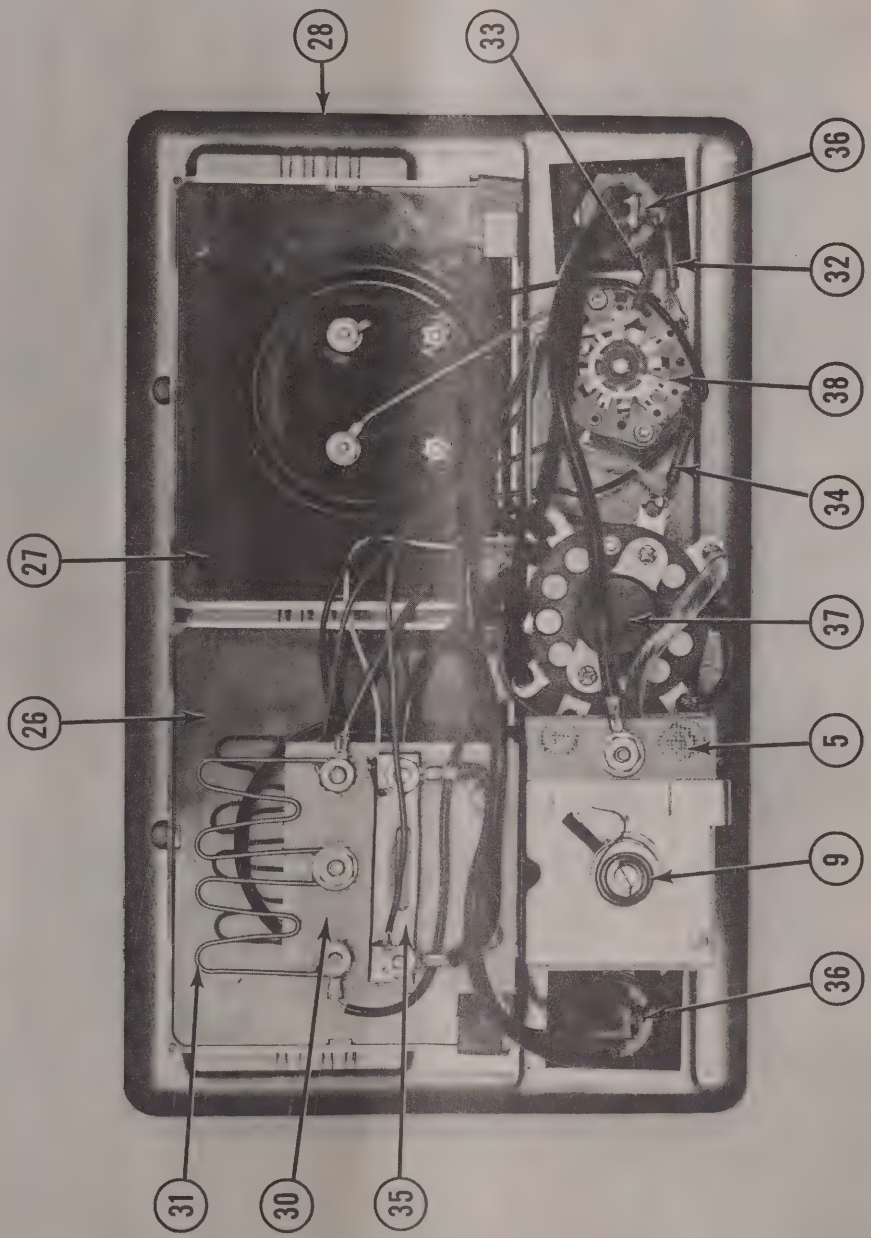


VOLT-AMP TESTER
E-1402

ALLEN ELECTRIC AND EQUIPMENT CO.

PARTS LOCATION PHOTOGRAPH

SERIES F



ALLEN ELECTRIC AND EQUIPMENT CO.

SERVICE PARTS LIST

VOLT-AMP TESTER
E-1402

MODEL	E-1402	E-1402	E-1402	E-1402	E-1402
SERIES	"A"	"B"	"C"	"D"	"E"
PARTS ILLUSTRATION PAGE	142-261	142-261	142-261	142-261	142-261
ILLUSTRATION SECTION	2	2	2	2	2

KEY NO.	PART NAME	PART NUMBER	PART NUMBER	PART NUMBER	PART NUMBER	PART NUMBER
1	Case (Complete)	A13716	A13716	A13716	A13716	A17987
*2	Feet (4)	6847-1	6847-1	6847-1	6847-1	6847-1
3	Handle (Complete)	A6824-1	A6824-1	A6824-1	A6824-1	
4	Spring (Handle)	6280-2	6280-2	6280-2	6280-2	
5	Carbon Pile (Complete)	A13443	A13443	A13443	A13443	A13443
*6	Collar Kit	A15764	A15764	A15764	A15764	A15764
*7	Disc (Carbon)	13467	13467	13467	13467	13467
*8	Spacer (6)	5067	5067	5067	5067	5067
9	Spring	13833	13833	13833	13833	13833
*10	Tube (Lava)	13445	13445	13445	13445	13445
*11	Circuit Breaker	11374-3	11374-3	11374-3	11374-3	11374-3
12	Knob	13487-2	13487-2	13487-2	13487-2	13487-2
13	Knob (2)	13487-1	13487-1	13487-1	13487-1	13487-1
14	Lead (Volt meter)	A12940	A12940	A12940	A12940	A12940
15	Clip (2)	1041	1041	1041	1041	1041
16	Insulator (Black)	1410	1410	1410	1410	1410
17	Insulator (Yellow)	2307	2307	2307	2307	2307
18	Plug	A15452	A15452	A15452	A15452	A15452
*19	Relief (Strain) (2)	6822	6822	6822	6822	6822
20	Lead (Ammeter)	A13466	A13466	A13466	A17396	A17396
21	Lead Repair Kit	A15640	A15640	A15640	A15640	A15640
	Insulator (only)	1187-1	1187-1	1187-1	1187-1	1187-1
22	Plug	A15453	A15453	A15453	A15453	A15453
*23	Relief (Strain) (2)	6822	6822	6822	6822	6822
24	Switch Cover (Bottom)	13457	13457	13457	13457	
25	Switch Cover (top)	13457-1	13457-1	13457-1	13457-1	
26	Meter (Amps)	7998	7998	7995	7998	7998
27	Meter (Volts)	7911-12	7911-12	7911-12	7911-12	7911-12
28	Panel	13053-16	13153-16	13053-16	13053-16	13053-16
29	Overlay	13485	13485	13485	13485	13485
30	Plate	13479	13479	13479	13479	13479
31	Resistor (1/8 Ohm) (2)	13481	13481	13481	13481	13481
32	Resistor (90 Ohm)	3884-2	3884-2	3884-2	3884-2	3884-2
33	Resistor (990 Ohm)	3040-2	3040-2	3040-2	3040-2	3040-2
34	Resistor (1000 Ohm)	2931-2	2931-2	2931-2	2931-2	2931-2
35	Shunt (internal 80 Amp)	13483	13483	13483	13483	13483
36	Socket (2)	A6797	A6797	A6797	A6797	A6797
37	Switch (Test)	A13470	A13470	A13470	A13470	A13470
38	Switch (Voltage)	A13480-1	A13480-1	A13480-1	A13480-1	A13480-1
	LOOSE PARTS					
39	Lead (Jumper)	A6875	A6875	A6875	A6875	A6875
40	Pin Connector (2)	9863	9863	9863	9863	9863
	ACCESSORIES					
*41	Shunt (External 8 Amp)	70006	70006	70006	70006	70006
*42	Shunt (External 160 Amps)	70007	70007	70007	70007	70007
*43	160A. Shunt Ext. Lead	A17960	A17960	A17960	A17960	A17960

MINOR REPAIR KIT- CUSTOMER MAY INSTALL.
MAJOR REPAIR KIT- SERVICE STATION USE ONLY.
* PARTS NOT ILLUSTRATED.

SERVICE NOTE-SEE END OF PART LIST.

VOLT-AMP TESTER
E-1402

ALLEN ELECTRIC AND EQUIPMENT CO.

SERVICE PARTS LIST

MODEL	E-1402				
SERIES	"F"				
PARTS ILLUSTRATION PAGE	263-264				
ILLUSTRATION SECTION	2				

KEY NO.	PART NAME	PART NUMBER	PART NUMBER	PART NUMBER	PART NUMBER	PART NUMBER
1	Case (Complete	A17988				
*2	Feet	6847-1				
3						
4						
5	Carbon Pile (Complete)	A13443				
*6	Collar Kit	A15764				
*7	Disc (Carbon)	13467				
*8	Spacer (6)	5067				
9	Spring	13833				
*10	Tube (Lava)	13445				
*11	Circuit Breaker	11374-3				
12	Knob	13487-2				
13	Knob (2)	13487-1				
14	Lead (Volt meter)	A12940				
15	Clip (2)	1041				
16	Insulator (Black)	1410				
17	Insulator (Yellow)	2307				
18	Plug	A15452				
*19	Relief (Strain) (2)	6822				
20	Lead (Ammeter)	A17396				
21	Lead Repair Kit	A15640				
	Insulator Only	1187-1				
22	Plug	A15453				
*23	Relief (Strain) (2)	6822				
24						
25						
26	Meter (Amps)	20243				
27	Meter (Volts)	20242				
28	Panel	A18136				
29	Overlay	18143				
30	Plate	13479				
31	Resistor (1/4 Ohm)	16394-1				
32	Resistor (190 Ohm)	18184				
33	Resistor (1990 Ohm)	18183				
34	Resistor (2000 Ohm)	18185				
35	Shunt (Internal 80 Amp)	13483				
36	Socket (2)	A6797				
37	Switch (Test)	A13470				
38	Switch (Voltage)	A13480				
	LOOSE PARTS					
39	Lead (Jumper)	A6875				
40	Pin Connector (2)	9863				
	ACCESSORIES					
*41	Shunt (External 8 Amp)	70006				
*42	Shunt (External 160 Amp)	70007				
*43	160A Shunt Ext. Lead	A17960				

MINOR REPAIR KIT-CUSTOMER MAY INSTALL.
MAJOR REPAIR KIT-SERVICE STATION USE ONLY.
* PARTS NOT ILLUSTRATED.

SERVICE NOTE-SEE END OF PARTS LIST.

ALLEN EQUIPMENT REPAIR SERVICE

AUTHORIZED FIELD SERVICE STATIONS

Allen equipment in need of maintenance service should be shipped complete, with all leads, to one of the Allen Authorized Field Service Stations listed on the next sheet, or the factory (unless located outside the U.S.A.), whichever is nearer or most convenient.

To expedite prompt repairs, your return order should contain a brief explanation of the difficulty, and specifically state whether the unit is to be repaired, or placed in "like new" condition.

REPAIR

When the equipment is marked "repair", it will be placed in proper operating condition only.

LIKE NEW

When the equipment is marked to be placed in "like new" condition, all necessary repairs will be performed and the unit will be refinished.

WARRANTY SERVICE

When warranty repairs are requested on a piece of equipment, it should be shipped complete, with leads, to an Allen Authorized Field Service Station or the factory for repairs, transportation prepaid. The work will be performed, and the instrument returned, transportation prepaid.

When repairs under warranty are expected, the following information must be furnished at the time the unit is shipped to the factory or Authorized Field Service Station for repairs, if within the U.S.A.:

Original Owner's Name	Model Number of Unit
Owner's Address	Serial Number of Unit (complete with
Wholesaler's Name	letters and numerals)
Wholesaler's Address	Date of Purchase by Using Owner

By following the proper procedure, you will assist the Allen Authorized Field Service Station, or the factory, if located in the U.S.A., in efficiently performing the work needed and returning your equipment to you with a minimum of delay.

WARRANTY POLICY

All Allen products are guaranteed against defect in workmanship and material for a period of one year from date of sale to the original using purchaser (excepting service parts which carry a 90-day guarantee).

CONTINGENCIES

Warranty shall not apply to a piece of equipment, or part thereof, which has, in our judgment, been rendered unreliable or inoperative through abuse, negligence, operation not in accordance with instructions, accident, or to unauthorized repairs or alterations. This warranty is valid only to the original using purchaser, and under no conditions does it apply to subsequent purchasers.

LIABILITY LIMITATIONS

Other than the above expressed warranty, we have not authorized any person or persons to give or assume for us any other liability in connection with the sale of our equipment, nor are we responsible for any obligation or liability for damage or injury to any person or property resulting directly, or indirectly from design material, workmanship, or installation on any of our equipment.

REPLACEMENT PARTS

Replacement parts may be obtained by ordering from Authorized Field Service Stations, or the factory.

Always specify model and complete serial number of the equipment, as well as the voltage and cycles, as indicated on the equipment name plate, when ordering parts.

ALLEN ELECTRIC AND EQUIPMENT CO.

Form No. R-151 Printed in U.S.A.

Allen WORLD-WIDE FIELD SERVICE STATIONS

AUTHORIZED SERVICE STATIONS — UNITED STATES

ALABAMA

Birmingham 4	Southern Jack Co. 615 N. 9th Street

ARIZONA

Phoenix	Dyna-Tronics, Inc. 3704 N. 7th Street

CALIFORNIA

Hawthorne	Dealer Sales & Service 790-792 Hawthorne Blvd.
Los Angeles	Vernon Electric Co. 233 W. Jefferson Blvd.
Los Angeles	Willey Electronics Co. 5426 W. Washington Blvd.
Oakland	Automotive Equipment Service 293 26th Street
Sacramento	Henderson Brothers 1800 23rd Street
San Diego	Dealer Sales & Service 1565 India Street
San Diego	Authorized Equipment Service 420 W. Beech Street
San Diego	Marine Electric Company 1991 National Avenue
San Francisco	Battery & Elect. Equip. Serv. 1016 Bryant Street

COLORADO

Denver	Hutchinson Electric 1248 Santa Fe Drive

DELAWARE

Frederica	Ferguson's Automotive Electric Service Route #1 at 113 & Bowers Beach Rd.

DIST. COLUMBIA

Washington	Allen Service Center, Inc. 1724 14th Street, N. W.

FLORIDA

Ft. Lauderdale	George's Electric Repair 607 S. Andrews Avenue
Ft. Myers	Ft. Myers Armature Works, Inc. 2333 Second Street
Jacksonville	Bill Burney's Radio & TV Service 2735 Rosselle
Miami	Fla. Precision Instr. Corporation 1221 Biscayne Blvd.
Orlando	Orlando Armature Wks., Inc. Box 3346, 600 W. Central Ave.
Orlando	Southern Armature Works 1550 Vassar Ave.
Pensacola	Pensacola Electric Garage, Inc. 223 W. Gregory Street
Sarasota	Brooks Electronics 411 S. Pineapple Ave.

GEORGIA

Atlanta	Electronic Equipment, Inc. 526 Plaster Avenue, N. E.

ILLINOIS

*Champaign	Hudelson Sales Company 302 E. University Ave.
Chicago	Master Electric Ser. Co. 835 W. Washington Blvd.
Peoria	United Radio Service 707 N. Main
Quincy	Gem Electronic Service 1036 Broadway

INDIANA

Fort Wayne	Wayne Electric Company 213 W. Brackenridge Street
Gary	Seaburg-Welsh Auto Supply, Inc. 400 East Fifth St.
Indianapolis	Elect. Tool & Motor Service, Inc. 34 W. 10th Street
Plymouth	Myers Auto Electronics 2100 S. Michigan Road

IOWA

**Cedar Rapids	Cedar Rapids Auto Supply 613 2nd Avenue, S. E.
Cedar Rapids	Stanley Reeder Radio & T.V. Service 118 6th Street, S.E.
Council Bluffs	Electro Lane, Inc. 225 S. Main Street
Des Moines	Electronic Engineering Co. 1100 Keo Ave.
**Dubuque	B. & G. Automotive Parts, Inc. 1084-1090 Iowa Street
**Waterloo	Lewis Motor Supply, Inc. 1801 Washington St.

KANSAS

Kansas City	A. F. E. Unit Service 2501 W. 45th Avenue
Salina	Wallis Company 516 N. 9th, P. O. Box 1057
Wichita 2	Alan Appliance Company 339 N. Main

KENTUCKY

Louisville	T. A. Kincheloe Radio Service 830 S. First Street

LOUISIANA

Shreveport	Authorized Equip. Service Co. 310 E. Stoner Avenue

MASSACHUSETTS

Watertown	Electronic Tune-Up Company 5 Louise Street

MICHIGAN

Battle Creek	Commercial Electric Company 333 Hamblin Avenue
Bay City	Van Zale Electric Co. 701 40th Street
Detroit	Serv. Air Inc. Detroit City Airport
*Grand Rapids	The Ridge-Grand Rapids Co. 1142 Division Avenue, S.
Grand Rapids	Millbrook Radio & T. V. 2407 Eastern Avenue
Traverse City	Northern Auto Parts Co. 324 E. Front St.

MINNESOTA

Minneapolis	Ecklen Radio Company 114 Lyndale Avenue, North
Minneapolis	Instrument Service Lab's. 5729 - 23 Avenue, South
Moorhead	Carl's Appliance Company 24 N. Fourth

MISSOURI

St. Louis	National-Northside Co. 2500 N. 9th St.
*Springfield	Springfield Electric Service Co. 1640 E. Trafficway

MONTANA

Butte	Automotive Supply Company 115 S. Arizona Street

NEBRASKA

Lincoln	L. J. Messer Co. 1939-41-43 O Street

NEW JERSEY

Jersey City	T & K Fast Charger Service 75 Cator Avenue
North Bergen	ATeCO 2106 Tonnelle Avenue

NEW MEXICO

Albuquerque	A-One Equipment Repair Co. 7205 Central, N. E.

NEW YORK

Bellmore	Automotive Electronics Equipment Co. 2606 Merrick
Huntington, L. I.	Emil Nass & Sons 274 New York Ave.
Lackawanna	Allen Service Center of Buffalo 593 Ridge Road
Oceanside, L. I.	Kraemer-Mayers Corporation 464 Merrick Road
Syracuse	Teds Electrical Ser. 449 Shonnard Street
Troy	R. V. Farmer Carb. & Ign. Service 113th Street & 5th Avenue
Yonkers	A. E. D., Incorporated 852 Midland Avenue

NORTH CAROLINA

Raleigh	Electronics Sales & Service Co. 403 W. Peace Street

NORTH DAKOTA

Bismark	Electronic Center Inc. 214 Broadway

OHIO

Cincinnati	Pleasant Electric Company 1725 Central Avenue
Cleveland	Makuh Electrolab 4787 Memphis Avenue
*Columbus 15	Ohio Auto Parts Company 4th and Spring Street
Findlay	Traucht Auto Electric 112 W. High Street
Sidney	Dunson Supply Company 328 N. Main Street
Toledo	Luttrell Auto Supply 915 Monroe

OKLAHOMA

Oklahoma City	Cox Radio & Television 111 N. W. Ninth Street
Tulsa	Hammond Electric Co. 810 E. Third Street

NOTE: AUTHORIZED SERVICE STATIONS: Authorized to repair all Allen Equipment.
SECONDARY SERVICE STATIONS: Authorized to repair only the equipment noted.

AUTHORIZED SERVICE STATIONS — UNITED STATES (Continued)

OREGON
Portland 9	General Electronics 338 N. W. Broadway at Flanders

PENNSYLVANIA
Harrisburg	Morrison Equipment Company 812 S. 29th Street
Philadelphia	Electric Tool & Service Co. 1608 Fairmount Street
Pittsburgh	Wilcox Brothers 5157 Liberty Avenue
Scranton	Auto Elect. Test Equip. Service 349 E. Locust Street

TENNESSEE
Chattanooga 11	Auto Equipment Co. 3227 Rossville Blvd.
Knoxville	Auto Radio Service Company 521 N. Central St., N.W.
Memphis	AATV Service 3375 Jackson
Nashville	Klugman Brothers 2700 Vanderbilt Place

TEXAS
Dallas	Commercial Parts, Inc. 3806 Ross Avenue
El Paso	Southwest Equipment Service 3831 Porter Street
Houston 3	Gilmore-Stewart Company 3509 Leeland
San Antonio 10	Fast Charger Company 548 Berkshire
Waco	Instrument & Meter Service Co. 1316-20 Franklin

UTAH
Salt Lake City	State Electronics Inc. 4689 D Holladay Blvd.

VIRGINIA
Richmond	Allied Electronics Company 324 W. Brookland Park Blvd.
Roanoke	Hubbard Service Center 1005 Salem Ave., S.W.
Winchester	Valley Distributors, Inc. 22 Amherst Street, Box 766

WASHINGTON
Seattle 22	Mosey & Mosey 1218 10th Avenue
Spokane	Atlas Television Service Co. N. 1316 Division St.

WEST VIRGINIA
Charleston	Abbott's Service & Repair 1213 W. Washington St.
Fairmont	Fairmont Auto Supply Co. 424 Fairmont Ave., Box 1227

WISCONSIN
Milwaukee	Ned Alpert 2779 N. 3rd St.

SECONDARY SERVICE STATIONS — UNITED STATES

ILLINOIS
*Champaign	Hudelson Sales Company 518 N. Hickory Street

IOWA
**Cedar Rapids	Cedar Rapids Auto Supply 613 2nd Avenue, S.E.
**Dubuque	B. & G. Automotive Parts, Inc. 1084-1090 Iowa Street
**Waterloo	Lewis Motor Supply, Inc. 1801 Washington St.

MICHIGAN
*Grand Rapids	The Ridge-Grand Rapids Co. 1148 Division Avenue, S.

MISSOURI
*Springfield	Springfield Electric Service Co. 1640 E. Trafficway

OHIO
*Columbus	Ohio Auto Parts Company 4th and Spring Streets

AUTHORIZED SERVICE STATIONS — CANADA

ALBERTA
Calgary	Hutton's Ltd. 131 11th Avenue, West
Edmonton	Loveseth Ltd. 10180 105th Street
*Edmonton	Grosser Parts, Ltd. 10177 107th Street

BRITISH COLUMBIA
Sidney	The Fairey Avaition Co. of Canada Ltd. P. O. Box 85, Patricia Bay Airport
Vancouver	Auto Marine Electric Ltd. 60 W. 3rd Avenue
Vancouver	Instrument Service Lab. Ltd. 29 W. Broadway
*Vancouver 3	Jeffree & Jeffree, Ltd. 775 Homer St.

MANITOBA
St. Boniface	Fields TV & Radio Service 351 Marion Street

ONTARIO
London	**James Cowan & Co., Ltd. 311 Talbot Street
London	Dominion Radio & TV Service 462 Dundas Street
Ottawa 3	Keyes Supply Co., Ltd. 80 Bayview Rd.
Toronto	Intricate Devices 1103 Yonge Street
Windsor	Downtown Auto Supply Windsor Ltd. 205 Glengarry Ave.

QUEBEC
Montreal	Instrument Sales & Service 1089 Bleury Street

SASKATCHEWAN
Saskatoon	Penn T.V. Co. 712 Broadway

AUTHORIZED SERVICE STATIONS — FOREIGN

BELGIUM
Bruxxelles, (Brussels)	Establissements, Daniel Doyen, S.A. 31-32 Boulevard, Du Midi

HOLLAND
Amsterdam	E. H. Mulder Chassestraat 60 (W. Netherlands)

ISRAEL
Tel Aviv	Bernstein Bros. Ltd. 13 Peth - Tikwah Rd.

ITALY
Milano	Libio Aureliano Principe Eugenio 6

JAPAN
Toyko	Banzai Trading Co., Ltd. 6, Tori 1 Chromes, Nihonbashi, Chuo-ku

MEXICO
Mexico City, D.F.	Electrical Works Laganda Guzman 43 Z. P. 17

SOUTH AFRICA
Natal	Val M. Marwick 12 Buchanan Street Pietermaritzburg

SWEDEN
Malmo	AGEBE i Malmo Aktiebolag Lundavagen 54
Stockholm	Aktiebolaget AGEBE Luntmakargatan 25

VENEZUELA
Caracas	Corporacio'n M. E. S. A. Avenida Victoria No. 40

* Battery Chargers Only
** Battery Chargers Only - Sold by this Organization

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